

2003-04 Influenza Season Summary  
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December 6, 2004

## **2003-04 Missouri Influenza Season**

### **Synopsis**

The 2003-04 influenza season began early and was severe throughout the state. Influenza A viruses predominated and affected all age groups. Children younger than three years of age accounted for 35% of all of the laboratory-confirmed influenza cases reported in Missouri. Five influenza-related deaths among children were reported. CDC identified a novel influenza A drift variant: A/Fujian/411/2002 (H3N2). This strain emerged as the predominant circulating strain and was not a component of the 2003-2004 influenza vaccine.

Sporadic cases were identified as late as the last week of July 2004. Based on data provided by the Missouri - United States Influenza Sentinel Provider Surveillance Network (US ISPSN), the State Public Health Laboratory (SPHL), and various Missouri hospital laboratories and health care providers, influenza activity began increasing in week 42 (the week ending October 18, 2003), peaked in week 51 (week ending December 20, 2003), and trailed off in week 19 (week ending May 15, 2004) [Figure 1]. Influenza peaked earlier in 2003-04 than it has since Missouri began systematically tracking laboratory-confirmed influenza data in 1992 [Figure 2].

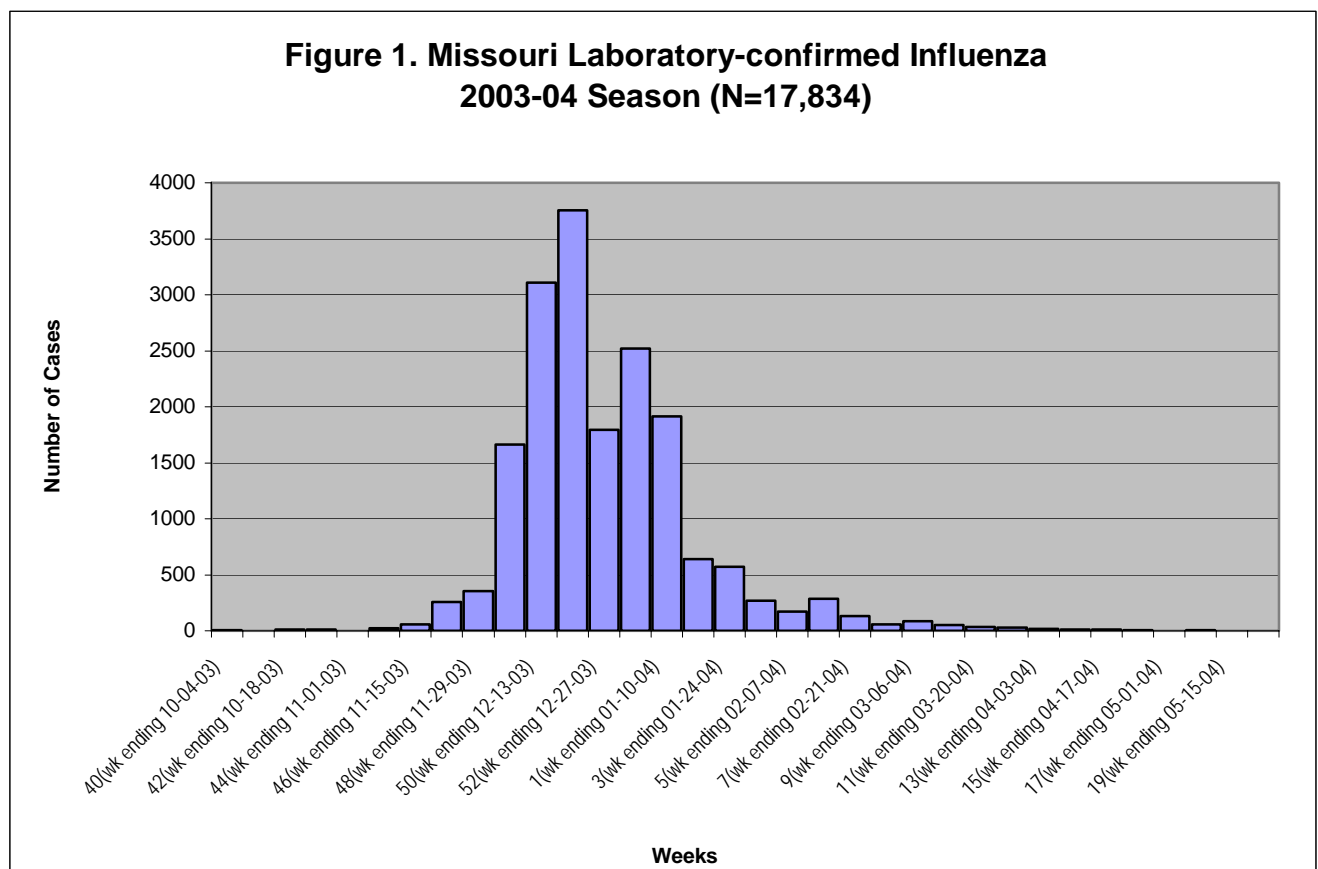
### **2003-04 Influenza Vaccine Composition**

CDC announced the 2003-2004 trivalent vaccine consisted of: an A/New Caledonia/20/99 (H1N1) strain, an A/Panama/2007/99 (H3N2), (an A/Moscow/10/99-like virus strain), and a B/Hong Kong/330/2001-like virus strain.

### **Laboratory-confirmed Influenza Cases**

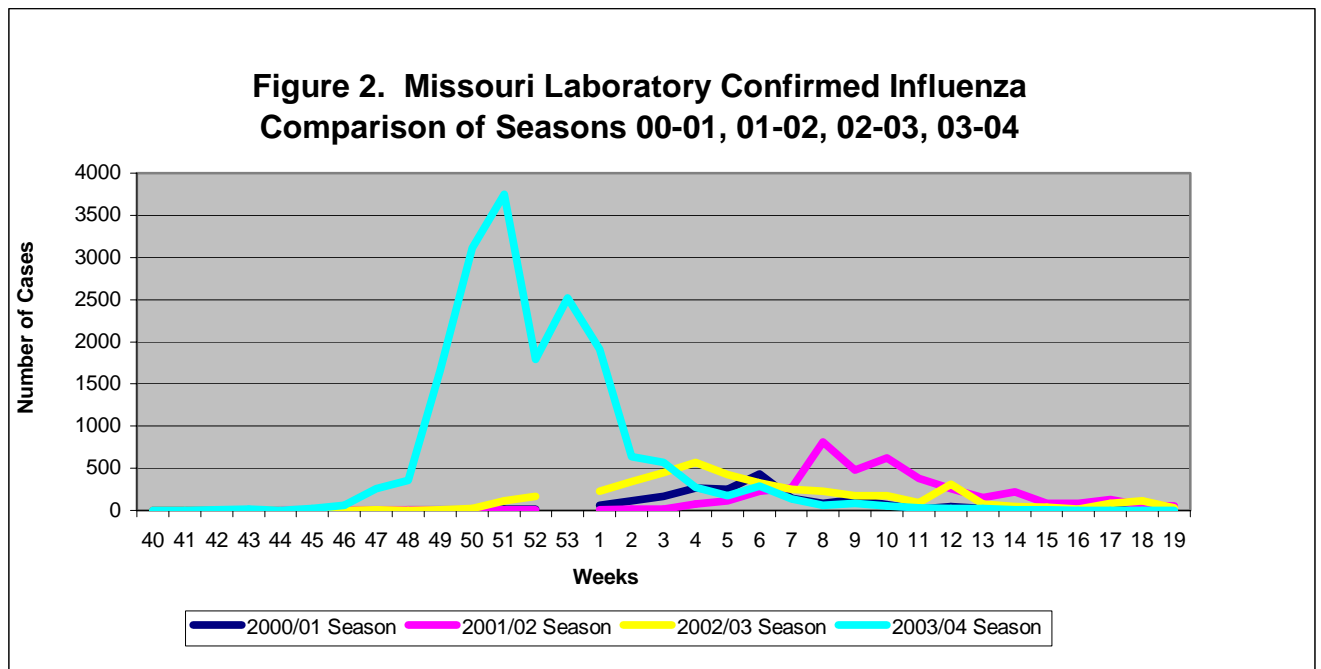
Initial reports of rapid test positives were received as early as late September 2004. This is not entirely unusual because isolated cases of influenza can be found throughout the year. Often these early cases are associated with someone who traveled internationally, who traveled with a large group tour, or attended large group gatherings. Because of the range of specificity and sensitivity associated with the *rapid* tests and the possibility of false positives or false negatives, the SPHL confirmed the first viral culture positive influenza case by this method on November 12, 2003. DHSS does not discount the possibility of prior influenza activity but confirms influenza activity using the most accurate means of testing currently available. Viral culture is considered the “gold standard” in influenza testing. The first positive *rapid* influenza test for the 2003-04 season was reported to DHSS on September 18, 2003. The diagnosis date of this case occurred prior to the traditional influenza season which characteristically begins in October. On October 7, 2003, the first viral culture positive test was reported from a middle-

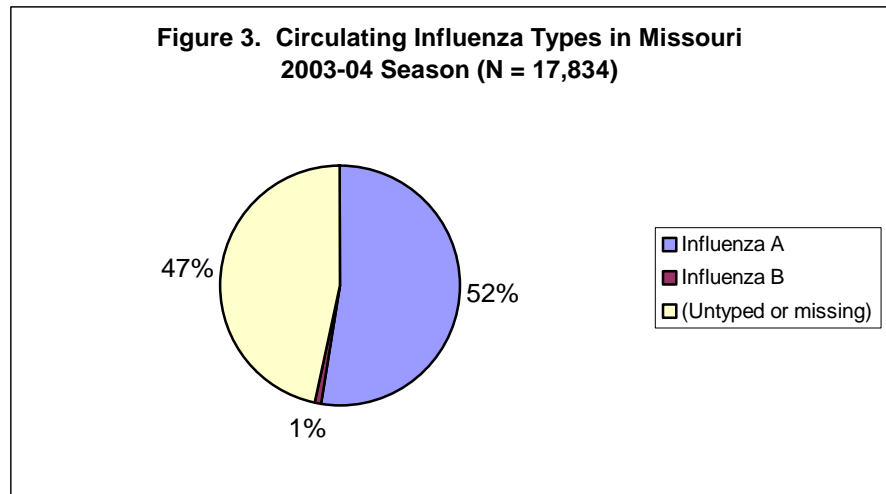
aged male in St. Louis. A St. Louis hospital forwarded a respiratory specimen to the SPHL for testing. Influenza B was isolated from the specimen by the viral culture method. The SPHL forwarded this specimen to the Centers for Disease Control and Prevention (CDC) where it was antigenically characterized by hemagglutination-inhibition method using post-infection ferret anti-sera. CDC reported the results of this isolate as antigenically similar to the B/Sichuan/379/99-like virus, which was the influenza B reference strain included in the 2001-02 influenza vaccine for the northern hemisphere. CDC found this remarkable because this B/Sichuan/379/99 was one of only two submitted in the nation early in the season and was one of 66 identified during the entire season. The last laboratory-confirmed (by viral culture) case of influenza indicated diagnosis date was March 12, 2004, while a few isolated cases by the rapid test method were reported throughout the summer of 2004.



There were 17,834 laboratory-confirmed cases of influenza reported between week 40 (week ending October 4, 2003), and week 20 (week ending May 22, 2004). Of the 17,834 laboratory-confirmed cases reported, 9,346 (52%) were typed as influenza A, 162 (~1%) were typed as influenza B, and 8,326 (47%) were un-typed or the serogroup identification was missing. Of the 9,346 influenza A cases, 129 (1.4%) were sub-typed as influenza A (H3N2) and 0 (0%) were sub-typed as influenza A (H1N1) [Figure 3]. CDC antigenically characterized a sample of 34 positive Missouri influenza isolates. Of those, one had a B/Sichuan/379/99-like

antigenic profile, which was the recommended B component of the previous (2001-02) season vaccine. Six influenza A isolates had an influenza A/Panama/2007/99-like (H3N2) antigenic profile, which was antigenically similar to the A Panama/2007/99-like (H3N2) strain contained in this season's (2003-04) vaccine. Twenty-one influenza A isolates had an A/Korea/770/2002-like (H3N2) antigenic profile, which was similar to the A/Fujian/411/2002-like reference strain. The A/Fujian strain was the predominant circulating strain in 2003-04 and was not a component of the 2003-04 vaccine.





Reports of laboratory-confirmed influenza began to increase in week 42 (week ending October 18, 2003) and increased steadily until week 47 (week ending November 22, 2003) with 259 cases for that week. After that, the reported cases rose sharply and peaked with 3,753 cases reported in week 51 (week ending December 20, 2004). The number of reported cases began to decline, but a second significant increase was noted in week 53 (week ending January 3, 2004). A gradual decline followed until the reported case counts returned to 0 in week 19 (week ending May 15, 2004). Isolated reports were received periodically throughout the remainder of the summer and early fall.

The total number of laboratory-confirmed influenza cases reported were more than four times those reported the previous two seasons, and the most reported in one year since DHSS began laboratory-confirmed influenza surveillance. While increased insurance reimbursement for rapid influenza tests, wider availability and use of rapid tests, and national reports of child deaths from influenza may explain some increases in the number of reported cases, these confounding variables are insufficient to explain them all. The main reason for this level of activity may have been related to the emergence of a novel influenza strain to which people in Missouri had little to no immunity and were vulnerable.

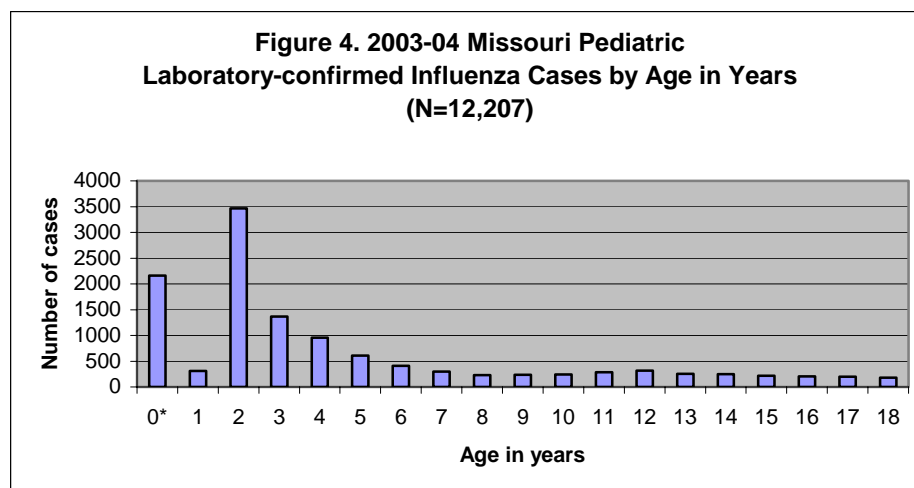
Incidence of influenza in Missouri followed a characteristic pattern among the age groups typically least immunized. Of all the laboratory-confirmed influenza cases reported (17,834), age variables were received for 17,162 cases. Of the cases for which ages were reported, 71 percent (12,207) of the cases occurred among those 18 years old and younger, 52 percent (8,874) were among those aged five years and younger, and 34 percent (5,939) were among those aged two years or younger. Children aged two years and younger made up the highest number of cases despite the encouragements by the Advisory Committee on Immunization Practices (APIC) to vaccinate children aged 23 months or younger (Figure 4) (see Prevention and Control of Influenza – full article at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5208a1.htm>).

Adults were affected by influenza as well. Ten percent (1,772) of the reported cases were among those aged 24 to 49 years, a remarkable increase in this age group compared to 6 percent for the 2002-03 season. There were considerably fewer laboratory-confirmed reports of influenza among the elderly [Figure 5]. These relatively low numbers of cases among the elderly

were not unexpected because immunization has historically been promoted among this age group because of the high risk for influenza-related complications.

## Influenza-like Illness

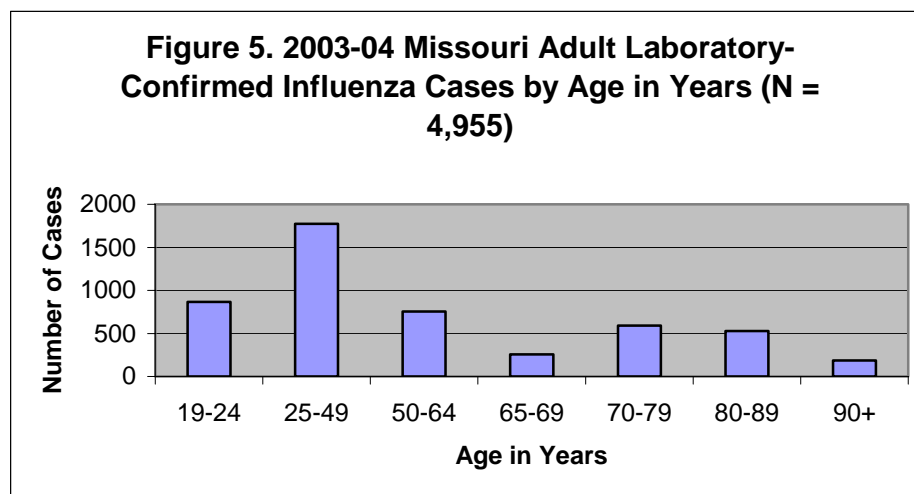
Missouri collected influenza-like illness (ILI) data through multiple surveillance systems. The Bioterrorism Surveillance (BTS) system consists of approximately 50 sentinel sites that report daily the numbers of patients seen with flu-like symptoms including malaise, headache, fever, cough, and sore throat. BTS sites participate voluntarily and include hospitals, clinics, healthcare providers, and schools. ILI data were also collected through the US ISPSN, a program in which DHSS partners with a sample of Missouri primary care providers and CDC to conduct statewide influenza activity surveillance. This system is designed to monitor the level of influenza activity and to monitor for emerging influenza strains in the state. Through the US ISPSN program Missouri collects and reports ILI data from more than 30 providers across the state. Participating physicians and nurse practitioners report each week the total number of patients seen that week and of those seen, the number of patients seen with symptoms of ILI (meeting the CDC case definition of: fever of 100 degrees Fahrenheit or greater with cough or sore throat in the absence of a known cause). Percentages of ILI activity are calculated by CDC from the sentinel provider data and then compared to a baseline number. The baseline for 2003-04 was 2.5 percent. US ISPSN providers also submitted respiratory specimens to the SPHL for viral isolation and analysis. Positive specimens were forwarded to CDC for antigenic characterization. CDC published national and regional reports each week during influenza season based on the data communicated to them by all of the US ISPSN participating states. These reports helped identify when and where influenza was circulating, identify the influenza viruses in circulation, detect alterations in the influenza viruses, track influenza-related illness, and measure the impact of influenza morbidity in the United States.



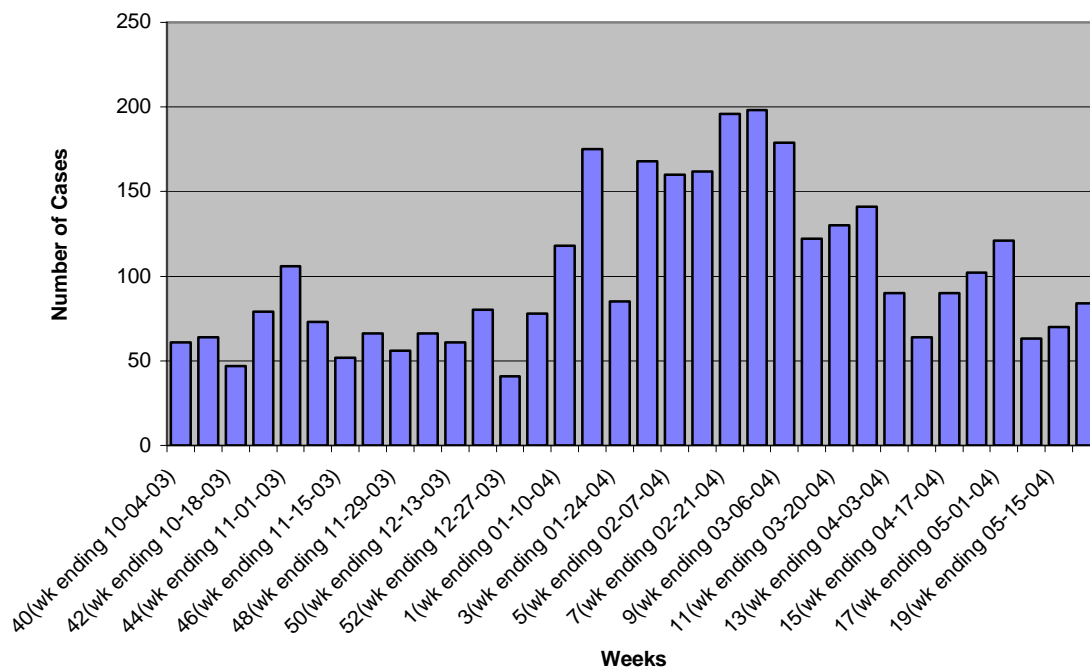
## Pneumonia and Influenza Related Deaths

The impact of influenza in Missouri is quantified by measuring pneumonia and influenza (P & I) deaths. P & I deaths include all deaths for which pneumonia and or influenza was listed as a primary or underlying cause on the death certificate. P & I deaths ranged from 41 to 198 in a given week according to date of report. Reports of P& I deaths followed a seesaw trend from weeks 40 to week 53 and then began to increase. P & I deaths, by date of report, peaked in week 8 (week ending February 28, 2004) and then began to decline, and again followed an up and down pattern through out the remainder of the season [Figure 6]. P & I mortality for 2003-04 (3,448) was considerably higher than for previous seasons and was well above the 5-year (1,188) and 10-year (1,224) medians.

Prior to September 2003, only deaths for which pneumonia and/or influenza listed on the death certificate as the underlying cause were counted as P & I deaths. Since week 35 of 2003 (week ending August 30, 2003), the number of P & I deaths includes both contributing and underlying cause of death. This change came about as a result of a CDC directive. This change has allowed for a more comprehensive look into influenza-related mortality.



**Figure 6. Pneumonia and Influenza (P & I) Deaths in Missouri  
During the 2003-04 Influenza Season**

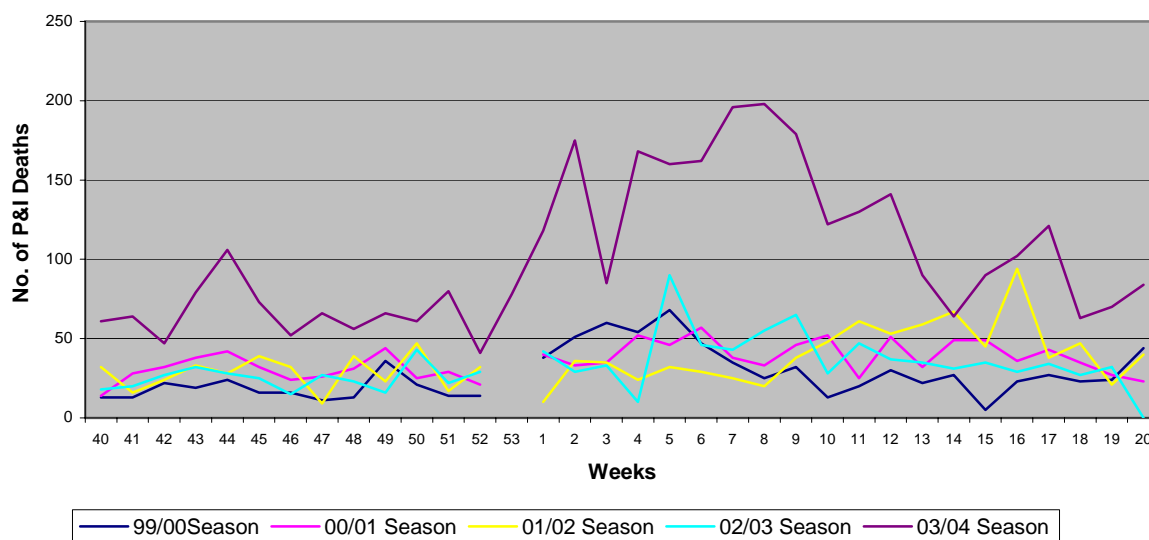


**Figure 7. Missouri Pneumonia and Influenza P & I Deaths**

1999-2000, 2000-01, 2001-02, 2002-03, and 2003-04

Comparison of Seasons

Provisional Data from MOHSIS Download July 7, 2004



## Community Outbreaks of Influenza-like Illness

DHSS received one report of a community influenza outbreak which is considerably fewer than the four reported last year. Children in Missouri were vulnerable to influenza in 2003-04. There were 16 school closings reported in 2003-04 as compared to 205 reported in 2002-03 when the prominent strain was influenza B. Community outbreaks of influenza-like illness were reported at one daycare center. School closings were reported from November 25, 2003, through December 19, 2003. The majority of the school closings occurred during a one-week period with 11 (69%) closures reported in week 50 (week ending December 13, 2003). Absenteeism ranged from 21 percent to 90 percent and classes were cancelled for 1 to 4 days. Students, faculty, and staff reported classic influenza symptoms including fevers, headache, cough, sore throat, muscle aches, malaise, and nausea and vomiting. Less common among the children were reports of influenza-related pneumonia and hospitalization.

## Additional Projects

Influenza-related anomalies were discussed in the literature in 2003-04. Articles that described pediatric influenza-related encephalopathies in Japanese and American children were published. Reports of pediatric influenza-related encephalopathies and unexpected influenza-



related deaths caused alarm among influenza experts and healthcare practitioners nationwide. In December 2003, CDC recommended that the states include pediatric influenza-related encephalopathies and pediatric influenza-related deaths (in anyone less than 18 years of age) a notifiable condition. Reporting of notifiable conditions are mandated either by state legislation or regulation usually upon a recommendation from CDC. Diseases that are notifiable may vary from state to state, but generally include internationally quarantinable diseases such as cholera, plague, and yellow fever, and are in compliance with the World Health Organization's International Health Regulations. DHSS notified Missouri health-care providers of this request through the Missouri Health Alert System. DHSS received reports of five pediatric laboratory-confirmed influenza-related deaths. The ages of these children ranged from 2 weeks to 3 years. Two of the children died while hospitalized, two others died while receiving emergency care, and one died en route. The 2003-04 season is the first season influenza-related pediatric deaths were reportable. DHSS will continue this surveillance in the future. There were two confirmed and one presumptive influenza-related pediatric encephalopathy cases reported to DHSS. DHSS will continue to monitor pediatric encephalopathy cases that are reported as influenza-related. These measures will help establish a baseline and help determine if an aberrant pattern of influenza-related illness and/or death is occurring among children.